



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Joseph M. Macko	Project Number J0115
Project Title Up, Up, and Away! Which Airfoil Generates the Most Lift at Subsonic Speeds?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to find out the most effective airfoil design to generate lift for aircraft going slower than the speed of sound.</p> <p>Methods/Materials I tested four common subsonic airfoils and also created a control airfoil. I produced scale versions of these airfoils out of Styrofoam. I exposed each airfoil to three speeds inside of a home made wind tunnel to see how much lift they generated. I measured the lift in grams using a digital scale.</p> <p>Results Of the five airfoils tested, the Laminar Flow Airfoil was able to generate the highest total average of lift at 11.223 grams. The Later Airfoil generated 10.667 grams of lift force. The Symmetrical Airfoil generated the third largest at 10.112 grams of lift force. The Clark #Y# Airfoil generated 9.889 grams of lift force. The control, which was used to show that airfoil design does affect lift, generated 8.998 grams of lift. The results show that my hypothesis was correct. The Laminar Flow Airfoil was successful in generating the most lift.</p> <p>Conclusions/Discussion Repeated trials with multiple airfoils show that the amount of lift that airfoils produce depends on if the airfoil has a large camber or leading edge. However, in order for an airfoil with a large leading edge to produce a substantial amount of lift, it has to have a slight camber.</p>	
Summary Statement My project shows which common airfoil is the most successful at generating lift in aircraft going at subsonic speeds, and the characteristics that made it successful.	
Help Received I asked Judy Schulte, an aeronautical engineer at Integrated Procurement Technologies, basic questions and she helped me design my wind tunnel. My dad help me build the wind tunnel. I tested and did data analysis on my own.	